

BEFORE THE
CALIFORNIA ENERGY COMMISSION

In the matter of Staff Workshop on)
Draft Revisions for Nonresidential)
Buildings Revisions for Possible)
Inclusion in the 2013 California)
Building Energy Efficiency Standards)

Design Phase Commissioning, Acceptance Testing,
Refrigerated Warehouses and Commercial Refrigeration

CALIFORNIA ENERGY COMMISSION
HEARING ROOM A
1516 NINTH STREET
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MONDAY, APRIL 18, 2011
10:00 A.M.

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Present: (* Via WebEx)

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Presenters

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Also Present

Attendees

Patrick Eilert, PG&E
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Jamy Bacchus, NRDC
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1 P R O C E E D I N G S

2 APRIL 18, 2011 10:04 A.M.

3 MS. BROOK: Here we are, it's 10:00 and we're at
4 the Energy Commission in California, and we're talking
5 about updates to the 2013 Building Energy Efficiency
6 Standards. Today we're talking about things in the Non-
7 Residential Building Energy Efficiency Standards domain.
8 So, let's move on.

9 So, just to make sure you're in the right room,
10 or on the right Web call, today we're going to talk about
11 these topics: Design Phase Commissioning and Acceptance
12 Testing, and then we're going to take a lunch break and,
13 then in the afternoon, talk about Commercial
14 Refrigeration and Refrigerated Warehouses.

15 In the last two workshops, the one we held on
16 April 4th and April 11th, Mazi spent several minutes
17 talking about, in detail, our policy objectives. And I
18 would direct you to those presentations on our Building
19 Energy Efficiency Standards website, I didn't include the
20 whole presentation here because I thought that those of
21 you that are participating in multiple workshops would
22 get awfully sick of hearing the same thing over and over
23 again.

24 So, anyway, just as an overview, we are trying to
25 make aggressive steps towards Zero Net Energy Building

1 Codes. For residential, the goal is to do that by 2020
2 and, for non-residential, the goal is to get to a Zero
3 Net Energy level of building energy performance by 2030.
4 And in this round, the 2013 update, we expect between 15
5 and 25 percent improvements in our Standards.

6 Another policy objective that we have is to get a
7 Commission approved set of Reach Standards, which is what
8 we call our voluntary level of efficiency standards that
9 go onto the base standards that the Commission adopts.
10 And this will be inserted into the Energy Chapter of
11 Title 24, Part 11, that's part of the California Green
12 Building Standards that gets developed and updated.
13 Okay, hold on a second. We have some technology issues
14 we're going to interrupt our presentation for, but you
15 can't hear me anyway, and that's what we're going to fix.
16 Okay, you can't hear this if you're on the Webinar, but
17 we're going to take a break and try to fix the audio part
18 of the Web meeting that doesn't seem to be working and I
19 think Ron just typed in something to that effect. So
20 stay tuned.

21 (Off the record at 10:07 a.m.)

22 (Back on the record at 10:11 a.m.)

23 MS. BROOK: I think we're back. So, if a few of
24 you could chat over there to Ron and see if you're
25 actually hearing our presentation that would be great.

1 You didn't miss too much, in fact, you've read everything
2 I've said, so I'm going to keep going and you can, of
3 course, ask any clarifying questions you have as we go
4 through the day.

5 So, I was talking about our Reach Standards and
6 that we'll be proposing our Energy chapter into the Part
7 11 update process, which will actually be aligned at the
8 same time as our 2013 Energy Code Update, and so the Part
9 6 and Part 11 will be updated at the same time, with
10 adoption in 2012, publication in 2013, and implementation
11 in January 2014. And that is actually the last bullet on
12 this slide, is that we're making every effort this Code
13 cycle to get alignment with the California Building
14 Standards Commission's three-year Code Update cycle for
15 the California Building Code.

16 So, this is our overall 2013 Energy Efficiency
17 Standards Update Schedule. We are in this pre-rulemaking
18 activity now where we are reviewing proposals developed
19 by the Investor-Owned Utilities Codes and Standards
20 Enhancement Program, and there's been many stakeholder
21 workshops that the case program has sponsored and
22 managed, and now we're doing public workshops to present
23 the final recommendations that we will be moving into
24 Code language this summer, so we expect a Commission
25 adoption of our 2013 update in March 2012, and as I said,

1 that would be published into the California Building Code
2 in 2013 and have an implementation date of January 2014.
3 So, we are working collaboratively with many people that
4 the Investor-Owned Utilities are managing work over to
5 get many proposals brought forward for consideration in
6 our 2013 Update, and I think I've said the rest of this,
7 we will be preparing 45-day language this summer, and
8 we'll begin our formal rulemaking in the September 2011
9 timeframe.

10 So, our first proposal or set of recommendations
11 that we want to talk about this morning is Design Phase
12 Commissioning. And just as sort of a disclaimer for the
13 day, I'm going to be doing most of the presentations, and
14 I'm going to be saying "we" a lot, but when I say "we," I
15 really mean the Case Authors, the people, the consultants
16 and technical experts that have put the Case Proposals
17 together, and have been working with stakeholders to iron
18 out issues. So, that work is what we're bringing forward
19 today and it's going to sound like it's coming from me,
20 but it really is based on the Case Reports that are
21 posted under this Workshop heading on our website, and I
22 would encourage you to look at those case reports, there
23 is a wealth and depth of information in there about how
24 the proposals were developed and what justifications are
25 made in there, what assumptions are made to get to

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1 expected levels of energy savings and benefit cost
2 ratios, and all of that detail is available on our
3 website for you to review.

4 So, Design Phase Commissioning. This will be the
5 first time in any energy code that I know of where the
6 design review process that's key to commissioning is
7 included in the Building Code. So, first, we'll talk
8 about what is design review and then where it fits into
9 in an energy code context. So, the Design Review Process
10 is a key part of building Commissioning, it confirms that
11 the design conforms to the project requirements, it
12 checks documents to make sure they're clear and complete,
13 and are free of significant error, and then also, through
14 the design review process, there is the ability to
15 suggest to the building project team best practice
16 designs and enhancements that can be made to improve the
17 energy performance of the buildings.

18 When you think about Design Review in the code
19 compliance context, we want to use it to confirm that the
20 design conforms to building codes, so it will improve
21 code compliance. We want to make sure that the
22 performance-based compliance, the energy modeling inputs
23 that are used as part of the performance based code
24 compliance are reflected in the design documents, so this
25 is an opportunity to really bring forward the key

1 features of buildings that a designer wants to take
2 credit for in our performance-based compliance approach
3 and make sure that these key features are getting checked
4 and reviewed as part of that design review process. And
5 there are other commission related requirements in the
6 Green Building Standard, CALGreen is the nickname for the
7 Green Building Standards, Title 24, Part 11, there are
8 commissioning requirements in there, but the
9 commissioning requirements in CALGreen do not include
10 this design review step, and so we'll be inserting this
11 design review process into the Energy Code, specifically
12 for energy-related systems that are part of our
13 compliance process and our energy performance standards.
14 And we also have acceptance testing that we're doing more
15 and more for more measures and to confirm performance in
16 the field for energy efficiency measures, and we want to
17 use the design review process to make sure that there's a
18 strong connection back to the design phase for these key
19 efficiency measures that we'll need to get acceptance
20 tested at the end of the process. And we want to make
21 sure that these requirements are reflected in the design
22 documents early in the building project process.

23 So, what are the benefits of design review? So,
24 you know, it has cost and time benefits, it reduces the
25 number of significant change orders in the building

1 design project, and reduces administrative time to issue
2 change orders and requests for information, it reduces
3 delays associated with resolving deficiencies. It saves
4 energy, it increases the compliance with Title 24 energy
5 requirements, and it also increases the adoption of best
6 practices that go beyond Title 24 because, again, you're
7 getting a team of experts to do an independent review of
8 your design and they are qualified and capable of making
9 recommendations for increased levels of energy
10 efficiency. And the result is a quality building that
11 operates as intended, it's easier to construct and
12 maintain, and has a lower long-term operating cost.

13 So, the objectives of design review in our Energy
14 Code is for it to be effective, but not overly
15 burdensome, for it to be practical with the target items
16 that have the most impact, and not be duplicative of
17 existing compliance processes. The effort and cost needs
18 to be scalable to the project size and, as we said
19 before, we want to integrate it with our acceptance test
20 requirements and the other commissioning requirements in
21 the Green Building Standard. And we, of course, want our
22 suggested procedures to be enforceable.

23 So, our proposed requirements, it's a two-step
24 requirement, the first, well, I think I'm jumping ahead
25 of myself here - yeah, so this is an overview of the

1 requirements and the two-step process, I think, is in the
2 next slide. So, we will require a design review for all
3 non-residential projects, and the design review
4 requirements will vary with building size and the
5 complexity of the energy systems that are included in the
6 building. There will be a requirement at the schematic
7 design kick-off meeting stage of the design process and
8 also at the construction document design review process.
9 So, there will be two distinct activities that will
10 happen, that will be part of these requirements.

11 For simple systems, the reviewer qualification,
12 you can basically check your own design if your building
13 is less than 10,000 square feet, the qualifications for a
14 design reviewer increase with project size and
15 complexity, you can do an in-house review for buildings
16 less than 50,000 square feet by a registered engineer, so
17 that's an engineering associate with no direct
18 involvement in the project design, and then third-party
19 review for large complex buildings by a registered
20 engineer.

21 So, this is sort of the path of where the
22 requirements fit into the design permitting and
23 construction process, so there will be a design review
24 kick-off as part of the schematic design phase, and then
25 a design review at the stage of preparing construction

1 documents, and those will result in a completed design
2 review checklist that gets signed by the appropriate
3 parties and submitted as part of the permit application.

4 So, the first step of the schematic design kick-
5 off meeting, it's an initial coordination of the design
6 project and design review needs. The kick-off meeting
7 will be held with the owner and the project team, they'll
8 discuss the design review process, and present the
9 required and best practice checklists that need to be
10 completed, and they'll discuss the future construction
11 document design review approach and any timing or
12 scheduling factors that are relevant.

13 The second phase, the Construction Documents
14 Design Review, is intended to substantially complete the
15 design documents that have been distributed. You're
16 checking to make sure the design documents are completed,
17 the design review performs a checklist review, and the
18 design review checklist is signed and sent to the owner
19 and the project team. The project team addresses review
20 comments, design review forms and sign-off are printed on
21 the bid set and submitted with the permit application,
22 and the Code Official confirms that the signed forms are
23 included in the plans as part of the compliance check.

24 So, in order to understand the value in the code
25 context of the design review, we had to estimate the cost

1 of the design review requirements and this is what was
2 assumed, that a simple and small building less than
3 10,000 square feet, the design review process could be
4 completed in 16 hours, and a moderate building that is
5 relatively simple and less than 30,000 square feet could
6 be completed in about 50 hours and a larger complex
7 building that requires third-party design review would
8 take approximately 145 hours when that includes both time
9 by the design reviewer and the designer to address issues
10 that are identified in the design review process.

11 So, the other half of the equation in the benefit
12 cost ratio is to assume how much energy savings will be
13 realized by including the design review in the Code
14 compliance process. So, in order to do this, what we did
15 was we used energy simulations with and without
16 compliance, with the efficiency measures that are most
17 often identified and fixed as part of a design review
18 process. Then, we had like the perfect energy
19 performance based on complete compliance, and then we had
20 a faulty simulation where the faults that are typically
21 identified in the design review process were not fixed,
22 and so those gave us the before and after design review
23 energy usage. And those savings that result from that
24 were discounted significantly based on the typical
25 frequency of fault occurrence, so we're not going to

1 assume that those faults happen 100 percent of the time,
2 so we discounted the savings based on how often we
3 expected to see those faults in a design review process.
4 They are discounted further to account for the ability of
5 the design review to actually identify the faults, so
6 we're not assuming perfection there either, we are
7 assuming that there are times when faults go unidentified
8 in the design review process. And then, we're also
9 discounting the savings based on not getting complete
10 compliance with our new design review requirements, so we
11 understand that it would be wonderful to get 100 percent
12 compliance, but we're not assuming that for the basis of
13 understanding expected savings.

14 Then, we also included a slight upward investment
15 of energy savings due to the fact that the reality of a
16 design review process actually results in adoption of
17 advanced or increased levels of energy efficiency, again,
18 because you have experts reviewing your design early on
19 and giving you enough time to respond to their
20 recommendations and you're able, then, to adopt advanced
21 energy efficiency measures that weren't in your original
22 design. So, we took a conservative estimate of that, but
23 we did try to account for that because it's one of the
24 real benefits of a design review process.

25 So, this is a summary and if you want to look at

1 this in detail, it is in the case report. This measure
2 is very cost-effective, it's got a simple average cost-
3 benefit ratio of over 4.5, it's over a multitude of
4 building types, it's got societal energy cost savings
5 that are significant and we think this is actually a
6 conservative estimate of the benefits of including design
7 review in a Code Compliance process.

8 So, the next steps for this work is to develop an
9 effective package of design review checklists, and to
10 also make the connection between the generation of that
11 checklist and our compliance software reporting
12 requirements, to make sure that, as I mentioned before,
13 if there's design features that are getting modeled and
14 getting taken credit for in the performance compliance
15 approach, that those features end up on a design review
16 checklist and make sure that they are included in the
17 design documents. And then we'll be developing code
18 language for this measure and it will be very simple,
19 probably only a few sentences that actually get inserted
20 into the Code language, because most of this work, the
21 checklists and the explanation of the process, will go
22 into our compliance manual, but there will be a reference
23 to these requirements in our Code language.

24 So that is it for Design Phase Commissioning, and
25 the way that I've organized the workshop is to kind of -

1 I can do two things, I can open it up for questions now,
2 or we can go all the way through the Acceptance Testing
3 Proposals and kind of open it up for all Commissioning
4 related proposals at the end of that, so I'm open to
5 either one. If you're not hearing a lot of chat, Ron,
6 then I'm going to probably keep going.

7 So, the next - yeah? Oh, and you're supposed to
8 tell them to come up to the microphone and all that.

9 MR. EILERT: Hi. Pat Eilert from PG&E. So,
10 Martha, the question is, is should we be including
11 something like a non-compliance discount into the savings
12 calculation at this point? Have we done that before?

13 MS. BROOK: I don't know. My guess is that some
14 proposals probably did and most didn't, but this one, you
15 know, I actually think it's appropriate because, 1) it's
16 still very cost-effective, right? And then, the other
17 thing is that this is a requirement that's never been in
18 the Energy Code before, right? And it is all about
19 improving compliance, so to assume that that process is
20 going to be perfect, I don't know, it just seems
21 appropriate in this instance to include that. Are you
22 concerned for -

23 MR. EILERT: Well, I just wonder if we're -

24 MS. BROOK: You're setting a precedent that -

25 MR. EILERT: Mazi is about to correct me.

1 MR. SHIRAKH: Go ahead.

2 MR. EILERT: I'm just wondering if we're setting
3 a precedent here. Generally, I'm not sure if it makes
4 sense.

5 MS. BROOK: Okay.

6 MR. EILERT: At this stage. Maybe it does, but I
7 haven't thought it through.

8 MS. BROOK: Okay.

9 MR. SHIRAKH: This is Mazi. In the previous
10 cycles of standards, every time we adopted a measure, we
11 always assume 100 percent of the savings were going to be
12 there. Unfortunately, that not only is not correct, it
13 kind of makes it harder later on to take corrective
14 action because the savings have already been claimed for
15 that measure. So perhaps what we need to do is actually,
16 for each measure, consider the persistence of the savings
17 and the measures we need to take to Acceptance testing,
18 design phase commissioning, you know, fault detection,
19 and diagnostics, and all of those should probably be an
20 integral part of each and every measure that we consider
21 from here on out for persistence purposes.

22 MR. EILERT: Yeah, and with the understanding
23 that would change over time, right?

24 MR. SHIRAKH: Right.

25 MR. EILERT: You know, compliance should increase

1 in the early years fairly quickly. So, it's time
2 dependent. Okay.

3 MR. YASNY: Martha? There's a question from
4 online: "Are you considering best technologies such as
5 IPD and BIM or BIMStorm during design review processes?

6 MS. BROOK: Well, so that's - I guess what we
7 will focus on in the design review is the design review
8 of the energy systems that are already considered and
9 part of our energy code, but if there's - I included this
10 concept that there's other technologies that are
11 recommended during the design review that increase energy
12 efficiency and go beyond Title 24. I'm struggling to
13 understand the question because building information
14 modeling is a great idea, but we don't have any
15 requirements for the project design to be done with BIM
16 compliant tools, so I'm not exactly sure how it would be
17 included in the design review process.

18 MR. YASNY: Well, Karl Stum is online and he is
19 helping you answer the question. "As a Case Author, I
20 can say that the design review will include a list of
21 beyond code energy saving features for the designer to
22 consider. This checklist could include BIM, though the
23 link to energy efficiency may be a little obtuse."

24 MS. BROOK: Okay, great. Thanks, Karl. Okay,
25 any other questions? Okay, so we're going to keep going.

1 Our next proposal is on Acceptance Requirements and this
2 set of - this specific proposal is focusing on improving
3 our Acceptance Tests based on what we're finding and what
4 actually is identified in the retro-commissioning process
5 as failures, and how can we actually improve our
6 acceptance tests to minimize those failures in the field.
7 So, the Case Authors accessed California Retro-
8 Commissioning Program Dataset that has been collected and
9 populated by retro-commissioning service providers in the
10 state and it looked at over 800 failures across 125
11 buildings and the criteria for selecting efficiency
12 measures for either improving a test, or creating a new
13 test, was the frequency of failures in the field, the
14 energy savings potential of those measures, and the
15 suitability of developing an acceptance test for that
16 measure. And out of that process - and, again, I would
17 encourage you to go to the Case Report if you want to
18 learn about all of the background research and analysis
19 that was done with those 800 buildings and how they came
20 up with these two tests, I would encourage you to look at
21 that Case Report. The result is two new acceptance tests
22 that will be included in the Code Update, one is for
23 Supply Air Temperature Reset Controls and the other is
24 Condenser Water Supply Temperature Reset Controls. Each
25 of these tests is anticipated. They're both cost-

1 effective, and they both expect to save, just doing the
2 test and improving compliance and performance, to save
3 \$.14 per square foot. So, the Supply Temperature Reset
4 Control test, it will take anywhere from half an hour to
5 two hours, the idea is for multi-zone air handler units
6 to test the supplier temperature, is reset based on
7 outdoor temperature and return air temperature, the test
8 needs to be done at both high and low load conditions,
9 and the specific details of the test are included in the
10 Case Report. The Condenser Water Supply Temperature
11 Reset Controls for water cooled chillers with the cooling
12 tower, it tests the Condenser Water Supply Temperature,
13 is reset based on outdoor air temperature or load, and
14 again, the time required to test is in the range of half
15 an hour to two hours. Did I get that right? I actually
16 think I might have that last one wrong, so the Case
17 Author may want to chime in. I think that's a Powerpoint
18 error, but I'll wait and see what somebody says about
19 that.

20 Well, actually, now would be a good time because
21 I'm on to the next one already. How do you go back with
22 this thing? So, anyway, that's a minor thing, the length
23 of time that the test takes, I guess I'm just surprised
24 that it's exactly the same for both tests, and so I think
25 I actually copied that wrong.

1 MR. MCGARAGHAN: Mike McGaraghan, Energy
2 Solutions, yeah, those are - they're not the same for
3 each test, I know that, and I think that they might have
4 to go back and check exactly, but they're longer than
5 those times. I think they range from about four to six
6 hours, total.

7 MR. YASNY: Here it is, two to four hours for
8 CWST.

9 MS. BROOK: Great, thanks. Was that Matt? Okay,
10 thank you. Okay, so the next Acceptance Test proposal is
11 to improve the effectiveness in compliance, so this is
12 based on a study that's being done by the California
13 Commissioning Collaborative, and it's a PIER funded study
14 that will have a final report published in, I think, a
15 few months. The objective of this work was to improve
16 the forms, improve the test processes, and to provide
17 outreach and education activities to improve the quality
18 of the acceptance testing that is actually getting done,
19 based on our Code requirements.

20 So, the key findings, and there was a lot of work
21 done here, again, I would encourage you to look at the
22 Case Report for the details. They did phone interviews
23 and interviewed both Building Departments and Designers
24 and other key stakeholders, and you know, the summary of
25 the findings are that the Acceptance Requirements and

1 forms are confusing, and the tests are only sometimes
2 performed, not always, like we would hope. There are key
3 issues like there's a financial disincentive to include
4 the costs of the test in a bid when you're competing with
5 other contractors that may not be doing the tests per
6 Code, so it's often not included in the bid unless
7 specifically requested. And nobody knows to ask about
8 the Acceptance Test forms, so that's a problem, and
9 sometimes incorrect forms are used, or the forms that are
10 used are not completed accurately or in its entirety.
11 And on-site verification is uncommon.

12 So, you know, it's unclear who is responsible to
13 specify the test, it's also unclear who is responsible to
14 execute the tests, but at the same time, people
15 understand that the tests are valuable, that it helps
16 them get functional equipment and that they're better off
17 with getting equipment that meets the design intent and
18 the Code requirements. So, they see the value in the
19 tests, but in practice the requirements are unclear and
20 complex.

21 So, the recommendations coming out of this work
22 is to make specific changes to the Compliance Forms to
23 improve clarity, to document additional details, to
24 improve functional test procedures, and the documentation
25 processes of the functional tests. So, a lot of work to

1 refine and clarify the forms is underway, and,
2 additionally, there will be at-a-glance guides developed
3 and added to the Compliance Manual so that, for specific
4 acceptance tests, these at-a-glance guides can be an
5 effective way to summarize the requirements and the steps
6 that need to be taken to complete the Acceptance Tests.
7 So that is actually all I have for the three proposals
8 that we had on the agenda for this morning, and we're
9 here to answer any questions that anybody in the room or
10 online have about these proposals. And then, what we're
11 going to have to do, unfortunately, the way that the
12 workshop day is shaping up, we actually will have to take
13 a long break before the afternoon session because our
14 Technical Case Authors for the afternoon are not here and
15 are not expected to be here until later on in the day.
16 So, do we have any questions?

17 MR. MCGARAGHAN: Mike McGaraghan, Energy
18 Solutions. I just wanted to point out that Martha just
19 covered the intent of the Acceptance Testing changes.
20 The majority of those changes will happen in the
21 Appendices and are not actually required to be approved
22 by the Commission on the same timeline, so she didn't get
23 into a lot of detail on the actual language of these new
24 proposed tests, but the case reports do contain first
25 drafts of the proposed tests, and we would be interested

1 in hearing feedback, so anybody who wants more
2 information on the way those tests are actually proposed
3 to be structured, you can find those there, and the Case
4 Author is listed there, as well, and would be glad to
5 take feedback on the tests.

6 MR. SHIRAKH: Mike, before you leave, you said
7 that most of the requirements are going to be in the
8 Appendices, presumably you meant the reference
9 appendices?

10 MR. MCGARAGHAN: Yes.

11 MR. SHIRAKH: And then you said that they will
12 not be adopted at the same time as the standards, that is
13 not correct, they will - the only document that will be
14 on a different timeline are the Compliance Manuals. They
15 will be developed after adoption, but reference
16 appendices will be adopted at the same time as the
17 standards and the ACM Manuals.

18 MS. BROOK: So, the first two tests, the Supplier
19 Temperature Reset Test and the Condenser Water Reset
20 Test, would have to be in the appendices and be part of
21 the 45-day language and everything that we do in the
22 fall, but anything that goes into the Compliance Manual,
23 the At-A-Glance Guides, Mazi, correct me if I'm wrong,
24 but improvements to the forms? Is that -

25 MR. SHIRAKH: Yeah, At-A-Glance and Forms are

1 part of the Compliance Manuals.

2 MR. MCGARAGHAN: I misspoke. The majority of the
3 changes are in the forms and that's what I meant would
4 not be going through the same timeline.

5 MS. BROOK: Okay, great.

6 MR. SHIRAKH: Thank you. Mr. McHugh?

7 MR. BACCHUS: Hi, happy to share. Jamy Bacchus,
8 NRDC. I have a number of comments and questions, many of
9 which were brought up during the stakeholder process.

10 MS. BROOK: Okay.

11 MR. BACCHUS: One of them concerns just
12 enforceability and the penalties or the ability of the
13 authority having jurisdiction to either refuse a
14 Certificate of Occupancy to a building that didn't
15 comply, that - so we have a review process at the
16 permitting phase where they have to sign off and actually
17 do forms, but what is the actual enforceability of the
18 early schematic part, the Part 1 portion of this? And we
19 see the same thing sort of in lead projects where you're
20 supposed to hire a Commissioning Agent early on and do a
21 schematic level design, but often that is just to have
22 the nature of the beast, that owners end up deciding they
23 want to go for a lead rating way late in the design
24 phase, and then suddenly you just end up implementing
25 this stuff as a formality, and it doesn't actually

1 benefit the projects. I'm curious what the stick is for
2 the early portion.

3 MS. BROOK: So, what you're saying is that they
4 would just basically be less than honest about the design
5 review checklist completion process?

6 MR. BACCHUS: Potentially. The second part, I
7 think, where they actually do have to do the review, yes,
8 I think they would actually do that, but you're actually
9 requiring this initial part if you go back to your
10 timeframe, that they would actually be involved almost
11 Day One, is there actually any way of enforcing that,
12 since there's no actual documentation for it? Is it just
13 sort of a general request that they do this?

14 MS. BROOK: Yes, so the Case Authors should
15 probably chime in and if you want to unmute Karl Stum and
16 Glenn Hansen, I don't know if you can do them both at the
17 same time. I don't know that we have a stick there, so
18 what could it be, right?

19 MR. BACCHUS: Yeah.

20 MS. BROOK: That's sort of the Catch 22 there.

21 MR. BACCHUS: And I don't know if there are any
22 code officials on the line, but -

23 MS. BROOK: Pull up that schematic real quick.

24 MR. STUM: So, this is Karl Stum. Am I off mute?

25 MS. BROOK: You are, we can hear you.

1 MR. STUM: Hey. So, I think the question was
2 whether or not there is a way to confirm that the early
3 design meeting was held, is that the question?

4 MS. BROOK: Yeah, so how do we confirm that they
5 actually did the design review kick-off at the schematic
6 design phase?

7 MR. STUM: Yeah, like you mentioned, I don't
8 think we had a stick for that, I mean, the form they sign
9 in the end at the permitting phase could say something
10 about that, but then what do you do if they haven't done
11 it, you know? So, I'll just back pedal and say I don't
12 think we have a mechanism there. But relative to the - I
13 think the issue at hand is to make sure that the
14 Acceptance Testing requirements are in the bid documents
15 so the contractors will bid them and that will take care
16 of that one problem you mentioned, Martha, from their
17 research, that people were not including it in their
18 bids, it wasn't in the specs. So, the design review,
19 then, later in design, would confirm that, in fact, those
20 requirements are reflected properly in the bid documents
21 and that the Commissioning processes are articulated
22 well, also, so that there's a better likelihood that the
23 tests will get executed as part of the commissioning
24 process, that the AT tests will get done, the traditional
25 CALGreen Commissioning.

1 MS. BROOK: Uh huh. So -

2 MR. HANSEN: This is Glenn Hansen. I'm sorry,
3 Martha, do you have something there?

4 MS. BROOK: No. Please.

5 MR. HANSEN: Okay, so this is Glenn Hansen, a
6 Case Author for Design Phase. I think you have to be
7 practical and assume over time people are going to learn
8 about this, and I think initially a schematic kick-off
9 meeting will probably be missed, and I think largely what
10 I have participated in Lead Certification submittals is
11 you go back and you make it up. And I think those people
12 are going to be caught not completing that step will have
13 to kind of, you know, fill out the form incorrectly, as
14 if this thing had occurred, and there will be some lost
15 opportunity of not having the initial coordination
16 meeting and discussion that could influence
17 recommendations from the design reviewer, so that's just
18 one step. The bulk of the value of design review will
19 still occur, it's just that you won't get some of the
20 benefits of the schematic design review meeting. And I
21 think, over time, people will learn and will start
22 holding that meeting.

23 MS. BROOK: Do you have any suggestions, Jamy, to
24 improve that?

25 MR. BACCHUS: Not off the top of my head, I

1 mean, we're taking best practices and trying to make them
2 Code, so it is an interesting thing and I applaud the
3 idea, I'm just not certain - is there any precedent
4 currently in Title 24 where we have something that is
5 required, but we have no means of enforcing?

6 MS. BROOK: Probably more than we'd want!

7 MR. BACCHUS: So, maybe this is fine, then. I
8 don't know if it leaves our Code Officials throughout the
9 state hanging on, "Well, what do we do? We don't have
10 any means of knowing this." But I'll point out that, in
11 the non-voluntary measures of CALGreen in Appendix A, we
12 have a similar commissioning requirement, or it's
13 voluntary, but it's already written up that we have a
14 commissioning authority who then has to look at the basis
15 of design and the owner of project requirements, very
16 similar to LEED new constructions, so we have essentially
17 - we're kind of duplicating a little bit, so we can look
18 and see if there's anything that's required, any process
19 - go ahead.

20 MS. BROOK: Well, I was just going to say I think
21 that Karl and Glenn should chime in here because they did
22 look at those CALGreen requirements and came to the
23 conclusion that it did not include design review, so they
24 probably need to chime in here, unless I misunderstood
25 what I think I understood from them.

1 MR. STUM: Yeah, this is Karl. The CALGreen
2 Departments state that the basis of design and owners
3 part of the requirements are reviewed and that they
4 exist, but it doesn't - that's not a review of the
5 design, that's just a review of some ancillary documents
6 that relate to the design.

7 MR. HANSEN: This is Glenn. The builder valuable
8 documents - and it's good project information that should
9 be disclosed and given to the design reviewer, so we're
10 not requiring it, but we would hope that there would be
11 sharing of that information. And, to a large extent, we
12 feel that the CALGreen requirements, whoever is going to
13 be performing those duties, would also be active
14 participants and perform the design review functions.
15 So, if I was an owner, I would write a scope of work that
16 would require my consultant to do both - all tasks, but
17 you know, that's a contract delivery issue that the owner
18 has got to work out and we're not going to impose it on
19 anybody. We think there's a great relationship between
20 the different requirements and it would be nice that they
21 do get integrated.

22 MS. BROOK: So that may be something that we can
23 push on when we look at the Part 11 Update, is to make
24 sure that there's a reference to our design review
25 requirements because it seems like, right now, the

1 CALGreen very first, you know, baby step into
2 Commissioning, asks for a lot of information, but it
3 didn't specifically talk about design review and
4 developing checklists and really the key thing we're
5 trying to do here is bring the need and acknowledgement
6 of acceptance tests way forward, that's how everybody
7 knows, and like Karl said, it gets into the bid
8 documents, and then also specifically calling out
9 features that you're putting in your performance Code
10 compliance that also need to be part of the bid documents
11 in the - so those are the key things that I see that
12 aren't specifically implemented with the sort of higher
13 level of Commissioning requirements in CALGreen.

14 MR. BACCHUS: This might be a separate kind of
15 question than the one I was initially asking, but is
16 Design Phase Commissioning then mislabeled? Is this
17 really just supposed to be peer review - design phase
18 peer review? And the Commissioning Review Process that
19 CALGreen currently stipulates is separate? That that's
20 actually how you can operate the building and making sure
21 everything is running properly? But this is more of a
22 peer review to make sure that it's Title 24 compliant?

23 MS. BROOK: I only got the second half of that
24 because -

25 MR. SHIRAKH: I was worried he would have to

1 repeat that.

2 MR. BACCHUS: Sorry to the people on the phone.
3 Is this, instead of really Design Phase Commissioning, it
4 is more just peer review design phase just for Title 24
5 compliance? That is, just to make sure that they've
6 picked up everything Title 24 requires and that they're
7 doing it?

8 MS. BROOK: I think we would be a little bit
9 broader than that in our - I don't know, I mean, I think
10 this is definitely why we're having these discussions, to
11 iron this stuff out. But I would hope that we could make
12 it a little bit broader so that, you know, anything that
13 is relevant to our Code is definitely the focus, but it
14 would be nice to think about ways to allow the design
15 review process to be implemented more broadly, though we
16 might not have any requirements that it's implemented
17 more broadly, to include other non-energy related
18 features of buildings, for example.

19 MR. YASNY: There was a comment from online, "How
20 about requiring a copy of design review comments with
21 back check on the documents?"

22 MS. BROOK: Hold on, to answer the one on the
23 phone and, Karl and Glenn, chime in here, but I think
24 isn't that the intent of the checklist?

25 MR. STUM: I'll take a shot at this. So, I think

1 the broader design review, you know, the details of
2 selection of equipment, size and equipment, checking for
3 the fire dampers, all of those would be alluded to under
4 the best practices, it wouldn't be linked to a specific
5 Code compliant check, so there will be some general
6 information under the best practice to go beyond just the
7 energy aspects of it.

8 MS. BROOK: Okay. That was Karl.

9 MR. THAMILSERAN: This is Thamilseran from
10 California Energy Commission staff. Based on the review
11 that we had done regarding the CALGreen Commissioning
12 Code that is currently being developed since from the
13 March review, there's a difference between what occurred
14 within the CALGreen Commissioning vs. the one currently
15 proposed in this one. If CALGreen Commissioning has a
16 subsection called "Basis of Design," but the part of the
17 requirement is that basis of design document is supposed
18 to be provided to the Commissioning Coordinator or
19 Commissioning Agent. There is no collaboration or design
20 review process at that stage, however, this particular
21 one is going to be requiring that specific item. That is
22 going beyond just submitting the document, to have
23 collaboration or a design review process that actually
24 takes place. Thank you.

25 MS. BROOK: Thank you.

1 MR. EILERT: Hi, this is Pat again from PG&E.
2 So, I know that the Commission is considering this sort
3 of document repository going forward and to a certain
4 extent it just seems like all of these are compliance
5 documents, and is there any reason why each of these
6 could not be sort of sent to that repository as soon as
7 they're done?

8 MS. BROOK: No, I agree with you, I think it's
9 part of the compliance process and we should be including
10 that in the scope of our repository.

11 MR. SHIRAKH: Yeah, the central repository that
12 you're talking about, the current plan is to actually
13 require all non-residential documents to be uploaded to
14 the repository, includes all acceptance tests in the
15 requirement that you just saw. So, somebody with a
16 license would have to sign those documents and upload
17 them and certify that it's accurate.

18 MR. EILERT: I think we're clear about this, but
19 at the point the design review kick-off is done, that
20 could be forwarded separately, right?

21 MR. SHIRAKH: Right.

22 MR. EILERT: Okay.

23 MS. BROOK: So, I suppose that - I guess you
24 could potentially think about, you know, a noodle, not a
25 stick, there could be something that we do at that kick-

1 off where we require a submission into the repository, is
2 that where you're going with that?

3 MR. EILERT: Just a form, yeah.

4 MS. BROOK: And then, you know, again, the
5 enforceability then becomes just like all our other
6 enforceability of time and resources, but there's
7 actually something there that you could - thanks, Pat.

8 MR. MCHUGH: Hi, John McHugh on behalf of the
9 California Statewide Codes and Standards Program. I
10 guess my first comments are about the design review, is
11 that, well, for buildings less than 10,000 square feet,
12 you know, it's self-certification, so the person who is
13 the designer, well, they showed up at the meeting because
14 they are one and the same, and then for buildings that
15 are less than 50,000 square feet, that's someone else in
16 the same company, so you know, that you might actually
17 have two people from the same company show up at
18 schematic design, again, not really that much of a
19 stretch. And so what you're really talking about is that
20 third one where we're talking about larger buildings,
21 actually hiring a third party to come in and do the
22 design review, and my expectation is that, over time,
23 that that can start being common practice. So that's
24 really - those larger buildings are really the only ones,
25 and of course there's more at stake on those buildings to

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1 some extent, there are other designers. The main reason
2 I actually came to talk, though, was about the - we
3 looked at the fairly significant savings from condenser
4 water temperature reset, you know, \$.14 a square foot is
5 not bad, so I would recommend that the Commission look at
6 the idea of actually having condenser temperature water
7 reset as an actual prescriptive requirement in the
8 Standard. So, it doesn't currently exist, you've got an
9 Acceptance test for something that someone might install,
10 but we're actually not requiring that they install that -

11 MS. BROOK: Right.

12 MR. MCHUGH: -- so that's just my recommendation.

13 MS. BROOK: Okay, yeah, thanks. We have gotten
14 that recommendation from other Case Authors and,
15 actually, the Case Authors are kind of chasing that down
16 right now because it seems at least preliminarily that -
17 is that a word - that it might - at least we're
18 understanding from some of our mechanical designers that
19 it's harder than it sounds. So, we need to make sure
20 that we understand that it's something that can and
21 should be done more often and it doesn't take an
22 exemplary design team to implement it. So, definitely we
23 need to keep talking about that.

24 Do we have any other questions about this
25 Commissioning in any stage of the process?

1 MR. HANSEN: Martha, this is Glenn Hanson. I
2 just want to comment to Jon McHugh's comment there about
3 the self check and check within the firm. I think an
4 important participant in this is the owner and that the
5 owner is going to get value by having these checks, and
6 it is in some sense hopefully a quality check in bringing
7 value to the owner for what he's paying for in design,
8 and I think so much of the industry is lacking in quality
9 because the owners aren't engaged and they're not
10 challenging their designers to do quality work, and I
11 think this is a really good topic for the owner to
12 hopefully get engaged with and challenge his designers to
13 give me close to perfect work.

14 MS. BROOK: Uh huh.

15 MR. HANSEN: I see that as an important person
16 and, you know, it's their capital, it's their money, so I
17 think that's maybe something to think about through
18 education is that, you know, this is a step that can
19 bring value to the owner by getting his designers to do a
20 good job in their own self checks.

21 MS. BROOK: Great, thank you. Yes, Jamy.

22 MR. BACCHUS: Yes, Jamy Bacchus, NRDC. One
23 comment back on the multiple layers of different review.
24 Some jurisdictions in the state have already adopted Tier
25 1 levels for CALGreen, others have Leed requirements. If

1 we end up having a design phase requirement that's
2 mandatory, it may not align with the requirements of Leed
3 for the Commissioning Agent in the Design Review process,
4 so it would be interesting to just take a look at what
5 changes in CALGreen might be coming up in 2012, and what
6 we're proposing, and make sure that we're not adding a
7 separate layer of cost that the owner that's paying for
8 this design review, that also will comply with any Leed
9 or CALGreen requirements, so that you don't have to have
10 two third-parties coming in, so to just look at the
11 different hats people are wearing.

12 MS. BROOK: Kind of like a sixth party -

13 MR. HANSEN: Sure.

14 MS. BROOK: Yeah, that's a really good point.

15 MR. HANSEN: Because I saw that we're requiring a
16 registered engineer, but it didn't say anything about
17 their Commissioning background. CALGreen has
18 stipulations in that, and so does Leed. On another note,
19 complex HVAC systems in the 50,000 square foot or greater
20 - or anything involving a complex HVAC, requires a third-
21 party, but I don't believe we've spelled out what complex
22 HVAC is.

23 MS. BROOK: So, that -

24 MR. HANSEN: Anything with a hydronics system,
25 anything not packaged?

1 MS. BROOK: Well, actually, Glenn, is that
2 included in the Case Report? I didn't see it, but I -

3 MR. STUM: That was a question that was brought
4 up at our last stakeholder meeting and I know ASHRAE,
5 IECC, they have definitions for complex vs. simple
6 systems. I don't think Title 24 does. And so that might
7 be part of the Code language is to come up with some
8 additional definitions. So, typically it is exactly what
9 you said, Jamy, is simple system, is packaged rooftop,
10 and complex is anything that is connected hydronically
11 with a boiler-chiller type arrangement. That's a simple
12 breakdown. But we could look at these other definitions
13 that are out there and bring them forward.

14 MS. BROOK: Great, thanks. Anything else?
15 Anything else on the phone? Okay, so for the rest of the
16 day, then, I have to counsel real quickly with Doug
17 Scott, who is here now and is going to be my technical
18 support for the afternoon refrigeration topics, and if
19 it's okay with him, we could potentially start earlier
20 than what the agenda says, so can you just everybody
21 online just hold on, time out for one minute and I'll be
22 right back.

23 (Of the record at 11:10 a.m.)

24 (Back on the record at 11:10 a.m.)

25 MS. BROOK: So, how come every time you ask a

1 question, I'm like multi-tasking? I didn't even hear
2 what you -

3 MR. BACCHUS: It was rhetorical. It was
4 basically, has anyone looked at Appendix A's
5 Commissioning Requirements in CALGreen? Is there a cost-
6 benefit ratio there that's preferable, that it really
7 should also just move into the mandatory section of Title
8 24 and out of CALGreen?

9 MS. BROOK: Okay, so that's a good point and
10 actually I thought it already was mandatory for every
11 building greater than 10,000 square feet in Part 11, so
12 we can think about that. I thought the idea of Part 11
13 was that it was commissioning as in whole building
14 commissioning, it was beyond and bigger than just energy.
15 But are you suggesting that we take all of the
16 Commissioning requirements and apply them to Energy
17 Systems in Part 6?

18 MR. STRUM: This is Karl. Am I off mute?

19 MS. BROOK: Yeah, we hear you.

20 MR. STRUM: I think something should be done, I'm
21 not sure whether - I understood that CALGreen
22 Commissioning was required over 10,000 square feet, it
23 wasn't optional; if that's true, then I think to make
24 things consistent, the design review portion of Part 6
25 probably should roll into and become part of the CALGreen

1 Commissioning so that the Commissioning is whole, or take
2 it all the Commissioning and put it in Part 6. But right
3 now, you know, we got off with CALGreen without design
4 review, and so we're inserting it.

5 MS. BROOK: Yeah, I guess - I mean, I don't want
6 to necessarily move Commissioning out of Part 11 because
7 I see value in Commissioning other things besides energy
8 systems, right? There's lots of reasons why you want to
9 Commission, it's not all about energy sometimes, it's
10 about other services in that building and other health
11 and safety things that you're actually commissioning.
12 But we could certainly add in the design review of energy
13 systems either as a reference in the Part 11 Code or, you
14 know, just insert it there, but I don't actually like
15 having it specifically in Part 6, as well, I don't really
16 want mandatory energy efficiency requirements in anything
17 besides Part 6, it's too confusing. So, I think we do
18 need to talk about that.

19 MR. STUM: Yeah, I would agree. The question
20 also is, except in testing requirements, are
21 commissioning - really, they're commissioning activities.

22 MS. BROOK: Uh huh.

23 MR. STUM: And so it becomes maybe confusing when
24 you look at the big picture and you have CALGreen
25 commissioning requiring commissioning process, but not

1 stating who the commissioning authority can or should be,
2 other than by suggestion in the compliance reference
3 material, and yet, there is another place, a whole
4 different place in the Code, where you're mandating
5 commissioning activities in Part 6 of the AT stuff. So,
6 it would be nice to have those all in one place.

7 MS. BROOK: Okay.

8 MR. STUM: I mean, it would be nice to have
9 Acceptance Testing requirements that are deemed to be
10 important like the ones that currently exist, either by
11 reference from CALGreen, or moved to CALGreen.

12 MS. BROOK: Okay -

13 MR. STUM: We wouldn't want, however, is to say,
14 well, we have CALGreen commissioning is required and
15 testing is required in CALGreen, therefore we can just
16 drop the AT stuff.

17 MS. BROOK: Uh huh, uh huh.

18 MR. STUM: You get that and then you would end up
19 getting all kinds of commissioning done under CALGreen,
20 most of - well, I won't say most, but much of which may
21 be less rigorous on those energy measures deemed to be so
22 important, and that's why the AT requirements are so - we
23 want to make sure the AT requirements are reflected,
24 continue to be reflected.

25 MS. BROOK: Well, so right now in Part 11 in the

1 Energy Chapter, we just make kind of a reference to Part
2 6, basically saying the Energy requirements are in Part
3 6. So could we do the same thing in Part 11? For the
4 Commission requirements, we could say "Design review is
5 required," you know, "Go to Part 6 for the details of how
6 to do that." And then, also, again for the Acceptance
7 Test, to call them out there as part of the functional
8 testing that needs to be done as part of the
9 commissioning process, but all the details of how and
10 when you have to do it are in Part 6? Is that too
11 confusing?

12 MR. STUM: Well, that would be - on the design
13 side, that would be good, on the testing side we would
14 have to somehow articulate that the AT requirements in
15 Part 6 are necessary, but not sufficient to comply with
16 the -

17 MS. BROOK: I see, I see, okay.

18 MR. STUM: But they are only a subset of what
19 really should be done as far as the testing.

20 MS. BROOK: Okay. All right. Did you have
21 something to say, Mazi?

22 MR. SHIRAKH: Actually, it's about the agenda,
23 but I'll wait.

24 MR. YASNY: Yeah, there is a question or a
25 comment online by Tim.

1 MR. FRYXELL: Hi, this is Tim Fryxell with
2 Guttman & Blaevoet. As a Commissioning engineer and also
3 as an installing contractor, the Title 24 documentation
4 is, you know, pretty on-site, you usually get the blank
5 stare from the contractors when you request the documents
6 and, "Hey, have you done your functional testing yet?"
7 "Yeah, yeah," "Well, where's your Title 24
8 documentation?" That's like a mind blower for some of
9 them, and some of these businesses have been around for
10 quite a bit of time. How can we do this like an online
11 registry, kind of like how CalCERTS does it with the HERS
12 rating that you enter in your information, you've done
13 your tests, you've done your verification, and then make
14 it the responsibility of the Commissioning engineer to
15 re-verify that those tests were being performed?
16 Because, as of right now, Title 24 documentation for,
17 say, demand control ventilation is voluntary, basically.
18 The mechanical contractor, "Yeah, I've done my job, I'm
19 finished," but unless you do another functional test on
20 the verification process, you won't know if that's
21 actually working or not. If you do an online registry,
22 at least you have a starting point that, if they don't
23 enter the information correctly, it will be rejected,
24 saying, no, you've missed a part or a step in the
25 process, and then if everybody is a part of that team,

1 everybody will get a log-in to verify what's going on
2 with that project and the results are still kicked in to
3 the CEC registry. Right now, if you hand them in to the
4 City Departments or the Building Departments, or whoever,
5 you're not sure if it's getting sent back. Am I on the
6 wrong page of this? Or making sense?

7 MS. BROOK: No, I think you are making sense. I
8 think what you're saying is that we don't have enough or
9 any of our Non-Res Acceptance Tests as part of the online
10 registration like the one on the HERS side.

11 MR. FRYXELL: Yeah and if you do that, it's not a
12 hard process, it's just, "Oh, the contractor, he's
13 filling out the documentation," it's like a checks and
14 balance, if you put in the wrong information, it kicks
15 back as wrong.

16 MS. BROOK: Right. If it makes sense for
17 residential buildings, then it makes double or triple or
18 quadruple sense for Non-Residential buildings.

19 MR. FRYXELL: Especially on refrigeration
20 verification, temperature resets, applied static resets,
21 I mean, if your information is not within the standard,
22 you know, it kicks back, "No." And then you have to
23 reformulate it and figure out why. But, on verification,
24 that should be one minimum stipulation of the
25 commissioning is just to verify that the Title 24

1 documentation, at the very least, has been performed, and
2 test that one sequence, just to make sure that it works,
3 other than just to say "Functional Test," Title 24 should
4 be at the very minimum at the top of their list to
5 verify.

6 MS. BROOK: Great, thank you.

7 MR. FRYXELL: Thank you.

8 MS. BROOK: Anything else?

9 MR. MCHUGH: Hi, this is Jon McHugh just wanting
10 to ask a follow-up question from the commenter on the
11 phone. So, are you recommending that there be - the
12 Commissioning Agent actually be a third-party testing
13 agent that actually re-conducts some fraction of the
14 tests that were conducted by - and I'm talking about the
15 acceptance test, some fraction of the Acceptance Tests
16 that were conducted by the Mechanical Contractor? Is
17 that what you were proposing?

18 MR. FRYXELL: Yes, at the very least because, you
19 know, the contractor says, "Yes, I've done my job," but
20 if when you get into that reality, I've checked several
21 of mine, they haven't been done. God, you push your
22 pencil pushers, "Yeah, yeah, you've just done it so you
23 can get the paperwork sent through." A lot of the
24 Building Departments are not even sure what the tests are
25 altogether. But, at least at the very third-party part,

1 because we are commissioning and we are verifying
2 building operations, just to verify that the minimum
3 requirement required by the state is completed.

4 MR. MCHUGH: Okay, and just to confirm, you're
5 not talking about reviewing the forms, you're talking
6 about re-conducting the test, some sample of those tests?

7 MR. FRYXELL: Yes.

8 MR. MCHUGH: Okay, thank you.

9 Mr. FRYXELL: At the very least. Thank you.

10 MR. MCHUGH: And, I'm sorry, what was your name?

11 MR. FRYXELL: Tim Fryxell with Guttman and
12 Blaevoet.

13 MR. MCHUGH: Thank you.

14 MR. STUM: Hello, this is Karl. I think one of
15 the - another idea there is just to have the
16 commissioning provider execute the tests with the
17 contractors so that, instead of the testing filled out by
18 the contractor, the AT test, since there is now a
19 commissioning provider involved, that they would be
20 responsible under the commissioning scope to do that,
21 like Tim was saying, either a sample of re-test or
22 executing them with the contractor and being the
23 responsible entity for actually filling in and submitting
24 the AT forms.

25 MR. FRYXELL: Exactly.

1 MR. STUM: The problem is right now is that the
2 CALGreen is - the strict language of CALGreen doesn't
3 even require a single entity to be in charge of the
4 Commissioning process. So it's like two steps down from
5 independent, it would be nice to say that somebody on the
6 design construction team needs to be the point person for
7 the commissioning process and make sure it gets done.
8 That's not even in there, secondly, it would be nice to
9 say that they have some qualifications and independence -
10 well, they do have qualifications in CALGreen, but not
11 that it's a single person, so you could have - so it's
12 going to be kind of hard the first cycle for people to
13 know what to do unless they follow a traditional
14 commissioning process with Leed or something. But I
15 think once we get that a little more articulated, some of
16 those other problems would go away because you have a
17 qualified and dedicated commissioning provider, they're
18 going to see all that gets done because that's what they
19 do.

20 MR. FRYXELL: I can hear that, exactly,
21 absolutely.

22 MR. HANSEN: This is Glenn Hansen, I just want to
23 make a comment that, you know, our observations talk
24 about Part 6 and Part 11 are no different than a building
25 design, we're looking at a design, different systems

1 where there's some missing information, there's
2 conflicting information, and if you would follow the
3 steps of commissioning, good practice and design review,
4 I think your conclusion would be that, hey, this needs to
5 go through a program design and look at what we're trying
6 to achieve, and bring the two, Part 6 and Part 11,
7 together. I guess that's my recommendation to the staff
8 is that this almost needs to be brought together and
9 really look at the details from a program design
10 perspective, and figure out where the practical
11 adjustments need to be made. Does that make sense to
12 anybody?

13 MS. BROOK: Yeah, I think so. I think we
14 actually are going to need your help doing that because,
15 you know, we need to understand the implications from the
16 people that have actually been trying to do commissioning
17 in the field, and actually look at Building Codes and try
18 to comply with them.

19 MR. HANSEN: Uh huh.

20 MS. BROOK: All right, thanks. Okay, Mazi.

21 MR. SHIRAKH: Any other questions related to the
22 topics from this morning? Here in the room? So we have
23 about an hour left. One proposal is, because Doug Scott
24 is here --

25 MS. BROOK: But his stakeholders aren't calling

1 in until 1:15, so -

2 MR. SHIRAKH: We're going to have to wait.

3 MS. BROOK: Uh huh.

4 MR. SHIRAKH: So we have to adjourn for the
5 morning and then come back at 1:15. And we will talk
6 about Commercial Refrigeration and Refrigerated
7 Warehouses.

8 MS. BROOK: Okay.

9 MR. SHIRAKH: So have a nice lunch. Thank you.

10 MS. BROOK: All right, so for those of you on the
11 Web call, we're going to sign off now. Will we keep the
12 meeting open? Yeah, we'll keep the meeting open and then
13 you can come back at 1:15 for the afternoon agenda.
14 Thanks.

15 (Off the record at 11:25 a.m.)

16 (Back on the record at 1:19 p.m.)

17 MR. SHIRAKH: Good afternoon. We're going to
18 start the afternoon session and this time we're going to
19 be talking about Commercial Refrigeration and, after
20 that, it will be the Refrigerated Warehouses, and Doug
21 Scott is going to represent both topics.

22 MS. BROOK: Here's how we're going to do it. I'm
23 going to sit up here and sort of introduce the slides,
24 and then Doug is going to chime in and add any technical
25 details that he thinks are especially important, or to

1 correct anything that I say that's incorrect. So, we'll
2 see how it goes.

3 So, Commercial Refrigeration, this is the first
4 time that we will be developing prescriptive requirements
5 for refrigeration systems, and these are the size and
6 type of systems that are typically found in supermarkets
7 and big-box retail stores. The Energy Commission is
8 doing this work in partnership with the California Air
9 Resources Board and the Air Resources Board has targeted
10 commercial refrigeration as one of its primary targets
11 for the reduction of greenhouse gas emissions, and so
12 we're working together to look at energy systems that are
13 installed in buildings from both the direct energy usage
14 of these systems and also the direct and indirect
15 greenhouse gas emissions caused by these systems. So, in
16 cases of refrigeration systems, we're looking at both the
17 energy consumed and the indirect emissions from that, as
18 well as the direct emissions from refrigerant leakage,
19 and our time dependent evaluation of energy, our societal
20 cost of energy accounts for both these components because
21 it looks at the energy used and the indirect emissions
22 from the power plants that generate that electricity, and
23 provide natural gas, and then it also is looking at the
24 carbon emitted from refrigerant leakage and assigning a
25 carbon cost to those emissions, so the energy efficiency

1 measures I will be talking about predominantly here today
2 will go into Part 6, Energy Efficiency Standards, will
3 also introduce direct measures - leak reduction measures
4 that we anticipate will be incorporated into Part 11, the
5 California Green Building Standards. These specific
6 reductions that I'll introduce today don't have
7 significant consequences on the energy side, so they are
8 direct emission reduction measures, and we've discussed
9 that they probably best belong in the green building
10 standards that are incorporated in the California
11 Building Code.

12 So, what we're going to talk about for the next
13 hour or more are the things that we're actually
14 recommending as Code change proposals. One is a set of
15 definitions that we need to introduce to cover the
16 commercial refrigeration domain and Code, and then we'll
17 be talking about each of these efficiency requirements,
18 floating head pressure, control requirement, condenser
19 specific efficiency requirement, floating suction
20 pressure, control requirement, mechanical sub-cooling,
21 display case lighting controls, refrigeration heat
22 recovery for space heat, and requirement for doors on low
23 temperature display cases. We'll also introduce that
24 we'll be developing acceptance tests for several of these
25 measures, and then I'll also introduce the leak reduction

1 measures developed by the Air Resources Board.

2 So the first one, and this is the first time that
3 you see this little draft Code language flag in the upper
4 left corner of the slide, so every time for the rest of
5 the presentation that we have Code language developed,
6 there will be a little flag up there to indicate that
7 this can be reviewed in the context of something we're
8 intending to put directly into our Code Update.

9 So, we have a series of definitions, I guess I'll
10 just briefly - I'll read these quickly, although I don't
11 expect to really spend too much time on these definitions
12 page, but basically the bubble point is being defined as
13 a refrigerant liquid saturation temperature at a
14 specified pressure, a cooler is defined as a space
15 greater than or equal to 28 degrees, but less than 55
16 degrees Fahrenheit. The dew point is the refrigerant
17 vapor site saturation temperature at a specified
18 pressure. Saturated condensing temperature is the
19 saturation temperature corresponding to the refrigerant
20 pressure at a condenser entrance for a single component,
21 and the zeotropic refrigerants, condenser specific
22 efficiency is the total heat of rejection capacity
23 divided by the fan input electrical power at 100 percent
24 fan speed, including auxiliary pumps and the power for
25 those evaporative condensers. A freezer is a space

1 that's designed to maintain less than 28 degrees
2 Fahrenheit and space designed for a convertible between
3 cooler and freezer operation. A micro-channel condenser
4 is an air cooled condenser for refrigeration systems,
5 which utilizes multiple small parallel gas flow passages
6 in a flat configuration, with unitized fin surface
7 between the gas passages rather than round tubes arranged
8 at a right angle to separate plate fins. The total heat
9 of rejection is the heat absorbed at the evaporator, plus
10 the heat picked up in the section line, plus the heat
11 added to the refrigerant in the compressor. So, that
12 covers the definitions and, again, I would encourage
13 anybody listening on the phone or in the room here, if
14 there are terms we're using to describe proposals that
15 you don't understand and aren't part of those definitions
16 we've just introduced, then we'd love to hear comments on
17 additional definitions we should maybe add to the Code.

18 So, the first set of commercial refrigeration
19 proposed measures are in terms of regulating the
20 efficiency of condensers. The first proposal is for
21 floating head pressure. For variable speed condenser
22 fans, for air cooled, or evaporative cooled condensers,
23 air or water fluid coolers, or cooling towers, multiple
24 fans serving common condensers need to be controlled in
25 unison. The variable condensing temperature set point

1 control, known as ambient following control, for air-
2 cooled condensers based on the ambient wet bulb
3 temperature, and there is a requirement for the minimum
4 condensing temperature set point to be less than or equal
5 to 70 degrees. Do you want to add anything to that,
6 Doug?

7 MR. SCOTT: So, I think the key issue there is
8 the variable speed on all condenser fans and the fact,
9 for example, on air-cooled condensers, all fan motors
10 would run in unison together at the same speed, so all
11 the surfaces being used at least down to a minimum
12 setting where fans could then cycle off. But the key
13 there is using all the surface all the time.

14 MS. BROOK: Great, thanks. So, this is the draft
15 Code language, I'm not going to read this because I
16 basically just summarized it in the previous slide, but
17 here it is if you want to read it while we're going
18 through the day, or if you want to make comments on the
19 specific language, and then send them back to us later,
20 that would be appreciated.

21 The next proposal is for condenser specific
22 efficiency, which as we said in the definitions, is the
23 total heat of rejection divided by the total fan power.
24 For evaporative cooled, we're setting a specific
25 efficiency of 160 Btu's per hour, per watt, and the

1 exceptions that we've identified for this is if the total
2 heat rejection is less than 150,000 Btu hours, or if
3 condensers are existing and being re-used in a new
4 application. The requirement for air-cooled is for a
5 condenser specific efficiency greater than or equal to 65
6 Btu hours per watt of fan power, and it has similar
7 exceptions for lower total heat rejection of the system,
8 or for existing condensers. And for air cooled
9 equipment, there's a requirement that the fin density be
10 less than or equal to 10 fins per inch. And the
11 exceptions for this is if you're using a micro-channel
12 condensers or, again, if you're using existing condenser
13 equipment. So there's only one note here that is
14 something that we're working on, and that is that - I
15 guess I should say, first off, that I'm going to present
16 a summary of all the energy savings impacts from all
17 these commercial refrigeration proposals at the end of
18 this section of the presentation. And you'll see that
19 they are all very cost-effective and we're only bringing
20 forward proposals that I think have industry acceptance
21 and show a very compelling cost-effectiveness.

22 So one of the things on this proposal is that the
23 specific efficiency was not found to be cost-effective in
24 a very few number of climate zones for condensers with
25 non-EC motors, so we're still working on what kind of

1 exception we should make to this. Do you want to clarify
2 that in any way, Doug?

3 MR. SCOTT: And the reason for that, in some cool
4 climates, it's cool enough most of the year that the head
5 pressure is already running at the 70 degrees minimum
6 most of the time and I think, in practice, people in
7 those areas would actually accept the minimum pressure
8 lower, so it could actually be cost-effective to most
9 users if they use a lower set point, but we didn't want
10 to have different floating head pressure set points, so,
11 no, this still has to be worked out.

12 MS. BROOK: Okay.

13 MR. SHIRAKH: Martha, can I ask a question? Is
14 there going to be a mandatory measure or prescriptive
15 measures? Will trade-offs be allowed?

16 MS. BROOK: Thank you for asking that right now
17 because these are actually mandatory requirements, we
18 don't have any trade-offs - correct me if I'm wrong,
19 Doug, but -

20 MR. SCOTT: That's correct. We were looking here
21 at specific efficiency vs. some other factors on
22 condensers, but we reduced it to this one measure.

23 MS. BROOK: So the idea, just for stakeholders in
24 the room and on the phone, ideally we want to get to a
25 performance-based method of Code compliance for

1 commercial refrigeration, but we are starting this cycle
2 with prescriptive requirements that are basically
3 mandatory requirements, so we're just getting, we're just
4 kind of setting the floor for a minimum efficiency levels
5 and for these refrigeration systems. We need more time
6 developing good design tools that are used by the
7 industry and good modeling assumptions developed and
8 tested over, you know, lots of design projects, so we can
9 feel more comfortable establishing a performance-based
10 compliance approach, and we anticipate doing that in the
11 2017 Code Update.

12 MR. SCOTT: Maybe two additional points. On
13 these numbers, the 160 and 65, are only slightly more
14 efficient than the base case that has been used in the
15 California new construction incentive program for a
16 number of years, so they're not significantly more
17 efficient than what has been used in many stores, but
18 also it's important to note that these condensers are not
19 rated to a particular - or are not published as being
20 rated to particular standard and they're not certified
21 ratings. So, as Martha said, it's a bit of a slow
22 approach to start with.

23 MS. BROOK: Okay, so this again is the Code
24 language for the condenser specific efficiency and we've
25 summarized all these points in the previous slide, but we

1 definitely want to hear comments if there are issues with
2 this language. Next, we're moving on to compressor
3 systems, floating suction pressure, control logic for
4 refrigeration compressor systems and condensing units,
5 where it would be a requirement to set the suction
6 temperature target based on the temperature requirements
7 of the attached display cases or walk-ins. The
8 exceptions that have been identified are for single
9 compressor systems without variable capacity for suction
10 groups with design section temperature greater or equal
11 to 30 degrees Fahrenheit, suction groups on the high
12 stage of a two-stage or cascade system, and suction
13 groups that serve chillers for secondary cooling fluids.

14 Is there anything there that you want to add,
15 Doug?

16 MR. SCOTT: No, I don't think so.

17 MS. BROOK: Okay, so this is the Code language
18 for floating suction pressure controls.

19 Next, we have mechanical sub-cooling, this is
20 "liquid sub-cooling must be provided for low temperature
21 parallel compressor systems with design suction
22 temperatures of less than or equal to 10 degrees
23 Fahrenheit. The liquid temperature must be maintained
24 less than or equal to 50 degrees. The use of Compressor
25 economizer ports or use of separate parallel medium, or

1 high temperature suction groups, with a suction
2 temperature of greater than or equal to 18 degrees, will
3 be required." The exceptions are single-compressor
4 systems, low temperature cascade systems, or existing
5 compressors. This is the draft Code language.

6 And now we're moving on to display case lighting
7 controls. So, for lighting in refrigeration display
8 cases and lights on walk-in glass doors, either there is
9 a requirement either to have automatic time switch
10 controls to turn off lights during non-business hours, or
11 provide motion sensor controls on each display case, and
12 reduce the lighting power at least 50 percent within 30
13 minutes of non-occupancy. And the only exception we've
14 identified are for stores that are basically almost
15 always open, so operating hours greater than or equal to
16 140 hours per week would be the only exception. And the
17 idea is that there's lots of energy here to be saved
18 during non-occupied store hours.

19 MR. SCOTT: Now, back up to - the motion sensor
20 option typically would come into play if the store is
21 using LED lights right now in glass door display cases
22 that reduce the light level where you turn off the lights
23 when there are no shoppers present, and if you have
24 those, they inherently meet the needs for the shutting
25 down the lights during stocking hours, and that 30-minute

1 time period can be a lot shorter on LED lights, but maybe
2 it needs to be longer were someone to use motion sensors
3 on fluorescent lights, so that it's possible that 30
4 minutes should be reduced to a shorter time period if
5 motion sensors are realistically always going to be
6 coupled with LED lights.

7 MS. BROOK: Okay, thanks. All right, our next
8 proposal is for refrigeration heat recovery to serve
9 space heating needs, and these are just two schematics of
10 a direct and indirect heat recovery approach. So, heat
11 recovery from refrigeration and HVAC systems for space
12 heating, the requirement is that at least 25 percent of
13 the heat rejection for all refrigeration systems must be
14 used for space heating and the heat recovery cannot use
15 more than 20 percent additional HFC refrigerant charge,
16 or a half a pound per thousand Btu's per hour of space
17 heating capacity, whichever is less.

18 So, I put this in the slide deck as an example of
19 how we looked at all of the refrigeration measures, we
20 looked at them both from an energy and an emission point
21 of view, and this is one example of where there was some
22 refrigerant cost penalty for the measure, but it is far
23 outweighed by the potential energy savings. So, the
24 numbers you see there in red are sort of cost penalties
25 due to the emission - potential for additional

1 refrigerant leakage or use, but it pales in comparison to
2 the energy savings that can be realized from heat
3 recovery and so we're confident in going forward with
4 this proposal, and the only other thing to indicate here
5 is that only in Palm Springs, or in that climate, is it
6 proved not to be cost-effective.

7 MR. SCOTT: Would you back up one slide? Recent
8 input on the second bullet there, the 20 percent
9 additional charge or the half pound per thousand Btu's,
10 we realized the 20 percent charge actually penalizes a
11 low charge system, which is sending the wrong signals.
12 If a system had a very low charge, it might be almost
13 impossible to accomplish the heat recovery and we
14 wouldn't want to imply the charge has to be increased in
15 order to meet this measure, so I think that, if possible,
16 to simplify this and just eliminate the 20 percent and
17 pick a number, probably something lower than 0.5 pounds
18 per thousand Btu's would be a better way to address this,
19 and also be simpler, so I think we need some additional
20 input on how low can we go if we just use a single
21 number, like .30 pounds per thousand Btu's or .25, but I
22 think definitely we want to simplify that because it's
23 sending the wrong signal with respect to low charge
24 systems.

25 MS. BROOK: Okay, great, thanks. Okay, so here

1 it is again in the Code language, and this is just to
2 demonstrate that I actually did read some of this stuff,
3 I found a word that didn't make the sentence clear to me,
4 so I X'd it out of there. So, that's the same things we
5 just explained, now in Code language.

6 Our next proposal is to prevent open display
7 cases in freezer applications, so these types of display
8 cases without doors will now be banished in the State of
9 California. And we'd much prefer to see these types of
10 display cases. So, upright low temperature display cases
11 that are designed for a supply or temperature of five
12 degrees or lower shall utilize reaching glass doors. So,
13 we'd like to hear comments on that if there are any, but
14 we think this is probably what is already always done, or
15 should always be done.

16 MR. SCOTT: But generally, I don't think we've
17 seen this in new store designs for at least a few years,
18 anyone using open upright freezer cases. However, the
19 situation that would occur would be remodels and
20 expansions that have these existing cases, so in those
21 cases of permitted new construction for an expansion,
22 say, if there were existing open cases, then to comply
23 with this, they'd have to be changed out to door cases or
24 medium temperature cases.

25 MR. SHIRAKH: So, to do that, I think that's a

1 great idea, so we have to say something about it in
2 Section 149, probably.

3 MS. BROOK: Okay.

4 MR. SHIRAKH: I mean, because 149 has additions
5 and alterations, so we have to make specific reference
6 from there to the section that would apply to
7 alterations, otherwise it would not be captured.

8 MS. BROOK: Great, thanks.

9 MR. SCOTT: And stakeholders have had this
10 concern about how remodels and expansions, rehabs, got
11 changes and so forth -

12 MR. SHIRAKH: The nice thing about 149 is you can
13 actually pick and choose which criteria you want to cover
14 when it comes to additions and alterations.

15 MS. BROOK: Okay, next is measures that we
16 strongly considered for 2013 Update, but didn't quite
17 make it, but we think belong in Feature Code Updates.
18 So, the first one, we're actually queuing up for the
19 Reach Standard in the 2013 Update, and this is CO₂-based
20 cooling for walk-ins and display cases, so this is for
21 secondary indirect CO₂ cooling and/or cascade cooling that
22 has significant greenhouse gas emission cost savings
23 compared to other technologies. So, this is an example
24 of a requirement that, from the societal cost of using
25 energy and the environmental consequences of these energy

1 systems, this is the future. We are trying to set a bar
2 in our voluntary standard for equipment that does a
3 better job with greenhouse gas emission cost savings and
4 that's why we're queuing this one up for the Reach
5 standard. It's sort of neutral on the energy side, but
6 again, the emission cost savings are significant.

7 The second one is the evaporator fan variable
8 speed controls, so we really wanted to do this, it's got
9 a really good benefit cost ratio and we think it's the
10 future of evaporator fan controls, but the lack of
11 experience with this technology specifically in
12 supermarket walk-ins is keeping us from going forward at
13 this time and, you know, ultimately we need to address
14 the concerns for food product safety if walk-ins are not
15 designed to work well with reduced air flow. We think
16 that we can do a lot in incenting this technology and
17 Savings by Design and other new construction programs,
18 and get industry experience with it, so we can promote it
19 in the 2017 update. And then, liquid suction heated
20 changes, this is another technology that saves energy
21 with this, you know, minor little flaw that the heat
22 exchangers leak, so we have to deal with that before
23 we're willing to bring it forward as a required Code
24 enhancement. Do you want to say anything else there?

25 MR. SCOTT: I think, on evaporator fan control,

1 the biggest concern there, I believe, is controls and
2 there's worry about circulation rates and product
3 temperatures and how well they work and boxes, certainly,
4 tall, and so on, but I think those can be addressed as
5 part of design practice. The key issue, I believe, is
6 controls and supermarket controls are performed by a few
7 key vendors that focus on that space, but the technical
8 challenge is that variable speed control, just like VAV
9 is going to be the first means of temperature control,
10 but that has to be sequenced with the EPR valves of the
11 liquid line solenoids, and also with floating suction,
12 which is another measure we have, and if this was done
13 without proper control sequencing, then you might be
14 choosing between variable speed and floating suction, and
15 we wouldn't want to do that, so the challenge, I think,
16 is to that relatively small number of control vendors to
17 say how do we add this control integration and accomplish
18 both variable speed control and floating suction without
19 compromises.

20 MS. BROOK: Good. So this is just a summary of
21 all of our proposed commercial refrigeration measures and
22 sort of just to get an idea of energy efficiency impacts,
23 so it's each of the measures we've introduced, both the
24 ones we recommended and two of the ones that have energy
25 savings, but that we did not recommend, just to get

1 people to understand, you know, how much energy we're
2 talking about here. It's significant, and one thing to
3 mention on the doors for the low temperature cases is
4 that all the other numbers are a per store estimate and
5 that one is actually a per case estimate, so depending on
6 how many cases you have in your store, that number would
7 change.

8 MR. SCOTT: That's based on a 12-foot open case
9 vs. a five-door doored case.

10 MS. BROOK: So, as you see, the evaporator fan
11 variable speed control is very appealing from, you know,
12 energy saving policy perspective, so we're going to be
13 targeting that pretty heavily with our partnerships with
14 the utility incentive programs to make sure we have
15 enough good design experience and work out the kinks with
16 the integrated controls, like Doug mentioned, so that we
17 can knock it out of the park next time. And I think
18 that's all we have. Oh, no, sorry, I have a little bit
19 more.

20 So, the next step for us to be working on is
21 developing Acceptance Tests for the Control-Related
22 Measures and we'll be doing that, you know, in the next
23 several months. And then I wanted to introduce the Leak
24 Reduction Measures, even though they will probably not go
25 into the Energy Code, they will be in the California

1 Building Code, and will be introduced and adopted in the
2 same Code update, the Building Code Update, that the
3 Energy Standards will be advanced in.

4 So, as a background for this, these next set of
5 slides were developed from the Air Resources Board, but
6 we have been working in partnership, looking at measures
7 from both the emission and the energy perspective. So,
8 refrigerator leaks are a significant source of greenhouse
9 gas emissions and the current Air Board regulations cover
10 leak checking and leak repair requirements, only, and not
11 system design and installation, so that's an area where
12 our agencies are partnering in this, you know, design
13 construction phase of refrigeration systems. And good
14 design and installation practices can significantly
15 reduce refrigerant leak rates. So, the measures that
16 we'll be introducing address refrigerant system design
17 and installation to minimize leakage, they're based on
18 ANSI, ASHRAE, IMC standards, as well as stakeholder
19 feedback. Their intended to set a floor and not a
20 ceiling for stores greater than 10,000-square-feet, so
21 they really are just like you just have to be doing this
22 type of design, there's just no reason not to, they are
23 those kind of measures. They don't overlap with the
24 existing ARB regulations and they're basically 12
25 measures related to the piping and connections valves,

1 corrosion prevention, and leak testing and monitoring.

2 These are the 12 measures, I'm not going to
3 explain them in detail, but I will introduce each of
4 them. There's a report that is more comprehensive that
5 was posted this morning to our website under today's
6 workshop, so you can look there for more details. The
7 first one is welded refrigeration piping is required and
8 cannot be threaded refrigeration piping, and these are
9 high level summaries, there's potentially some exceptions
10 to each of these, which the report will go into details
11 on, I just wanted to give you the flavor of these today.
12 Copper tubing refrigeration has to be greater or equal to
13 quarter-inch outside diameter, no flare fittings will be
14 allowed. Pressure relief valves must have visual
15 indicator for refrigerant release, and only Schrader
16 access valves with brass bodies can be used. Valves
17 shall have an internal stem diagram or seal caps with
18 chain tethers to fit over the stem, evaporator coils and
19 deli cases must be coated, and piping and components
20 installed to protect from physical damage, so this is an
21 installation requirement that you have to install your
22 piping and components to make sure that they cannot
23 easily be damaged. And similarly, refrigerator and
24 piping should be accessible for leak detection and
25 repairs. Level sensors will be installed on receivers

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1 with greater or equal to 200 pounds of refrigerant,
2 pressure tests will be required for the system during
3 installation prior to the evacuation and charging, and
4 then the system must be evacuated following pressure
5 testing and prior to charging.

6 So, this is a summary of the impact, the cost per
7 store, the emission reduction estimated from the measure.
8 The savings are due to the reduced refrigerant usage, the
9 cost effectiveness increases as the store size increases,
10 and there is a small net cost to smaller stores, but the
11 Air Resources Board believes that the carbon reduction
12 costs are still considered moderate and we will be
13 proposing that these leak reduction measures are applied
14 to all store sizes. So, there's additional links to the
15 full detailed report for leak reduction measures at these
16 two links, a summary of the measures, though it doesn't
17 include the cost benefit analysis, is also on our
18 workshop website, and Glenn Gallagher of the Air
19 Resources Board is the project manager for the ARB on
20 this and can be contacted at this address.

21 Okay, so now we're going to open up the questions
22 for everything you heard about on the commercial
23 refrigeration proposals. And, Mazi, do you want to
24 start?

25 MR. SHIRAKH: One question related to not

1 allowing open refrigerated cases. Some big-box stores,
2 they actually have a room in the back that is the
3 refrigerated to near freezing, and then it's totally open
4 to the rest of the space and especially during the
5 heating season, that seems to be a problem. Is that
6 still going to be allowed, that practice?

7 MR. SCOTT: So there's big-box stores that use
8 walk-in cooler for the shopper can walk inside the cooler
9 with a shopping cart and get their produce or dairy
10 sometimes, that actually have an open or air curtain as
11 opposed to a door, and that is not being addressed,
12 there's no prohibition on doing that or any position
13 taken on whether doors or skip curtains, or air curtains
14 should be used. The arguments are, yeah, the door is
15 inefficient being a wide open space and to a cooler, but
16 on the other hand, shoppers are walking inside as opposed
17 to having an equivalent amount of display cases. The
18 retailers have different reasons for doing that and I'd
19 say it lacks study, where we have looked at that and
20 attempted to analyze that for different chains, and it's
21 very difficult with ASHRAE information to come to any
22 real strong conclusions. Air doors have not been
23 independently tested, so it's hard to refute or prove one
24 way or another, so probably testing would be in order to
25 even say it's necessarily that inefficient for the

1 purpose, not included, to answer your question.

2 MR. SHIRAKH: All right. The other clarification
3 I have related to TDV's is that there is a factor to
4 capture greenhouse gas, CO₂, or carbon. You mean like an
5 equivalent, because, you know, the greenhouse gases don't
6 have CO₂, but they have an equivalent index like -

7 MS. BROOK: Yeah, right. So it's that index -
8 what turns everything into how many units of carbon.

9 MR. SHIRAKH: Okay.

10 MS. BROOK: And it's a carbon cost that we
11 include in the evaluation.

12 Mr. SHIRAKH: Okay, all right. Thanks.

13 MS. BROOK: Any other questions in the room? Is
14 there anything - nobody - everybody likes your proposals,
15 Doug.

16 MR. EILERT: Hi. Pat from PG&E. I was just
17 wondering if you could comment on the 10,000-foot
18 threshold in the presentation.

19 MR. SCOTT: The primary intent was to address
20 supermarket refrigeration, so the refrigeration systems
21 which are predominantly parallel type systems, whether
22 they're central rack systems, or decentralized type of
23 parallel racks, and those are common in stores down as
24 low as 8,000 square foot; below that, usually it becomes
25 an entirely different type of system, split systems,

1 single compressor units, and so rather than try to
2 address both, we focused on addressing the parallel
3 refrigeration systems, that would leave convenience
4 stores with a large number of sites, and each may have
5 three or four systems. That's something we didn't
6 address, but we think it needs to be addressed in an
7 entirely different way. Does that answer your question?

8 MR. MCHUGH: So, I'm very supportive of this -
9 oh, this is Jon McHugh - very supportive of this
10 proposal. There's one piece I'd like to see a little bit
11 more study on, which is the lighting controls. We see
12 lighting controls look like they're one of the largest
13 measures when you look at the kilowatt hours per store
14 savings, and I'm assuming those savings are a store that
15 isn't exempted, and so we have these stores that are
16 operating 24 hours, there's motion control case lighting
17 that has been effectively used in some of these stores.
18 My understanding is that, right now, we've heard some
19 negative feedback from stores where they were turning the
20 lights all the way off, and so I would just like us,
21 before the 45-day language, to revisit the issue of
22 whether or not the systems where they're dimming the
23 lights, not turning them all the way off, if that is a
24 reasonable requirement for those stores that operate long
25 hours.

1 MR. SCOTT: I think a couple comments. It's a
2 fast-moving technology in terms of both the controls and
3 which cases use LED lights that are usually coupled with
4 motion sensors. Initially, and it may be predominantly
5 even now, it's primarily glass door, frozen food cases,
6 whereas this lighting control measure is every display
7 case, and so the technology is a different stage for the
8 different cases, but we are talking a ways off when this
9 takes effect, so point well taken.

10 MR. BACCHUS: Jamy Bacchus, NRDC. A follow-up to
11 Mazi's question about refrigerant leakage and the global
12 warming impacts. Did you say, Martha, that in a TDV, we
13 are assessing a value of refrigerant leakage direct
14 emissions?

15 MS. BROOK: Uh huh.

16 MR. BACCHUS: If so, what is that for, let's say,
17 supermarkets or small grocery stores, or big-box? Are
18 you assuming a particular refrigerant R-404A and 15
19 percent leakage annually? Can you tell us a little more
20 about that?

21 MS. BROOK: Maybe you could do that, Doug, since
22 you guys ran the -

23 MR. SCOTT: Yeah, there's how much charge the
24 system had, what's the leakage, and what's the
25 refrigerant, and the refrigerant was assumed to be 404A

1 or 507, so that's the 3,000 to 4,000 carbon equivalent,
2 although realize there's alternatives. The leakages
3 rates are different for different system types that are
4 in some of the early stakeholder presentations. I'm not
5 sure they all carried over into the case study.

6 MR. BACCHUS: Yeah, I think you and I looked at
7 those with Pamela.

8 MR. SCOTT: It's a fairly wide range and some
9 discussion of how do some of the newer system types have
10 lower leak rates, but there's not enough time that
11 they're persistently lower. Maybe the key thing is we
12 did use the 404A/507 equivalent levels.

13 MR. RONN: Are you accepting questions from the
14 phone?

15 MS. BROOK: Yes, we are.

16 MR. RONN: Okay, I have a couple of questions.

17 MS. BROOK: Can you identify yourself first?

18 MR. RONN: George Ronn, SuperValu.

19 MS. BROOK: Okay, great. Thanks.

20 MR. RONN: On the heat recovery measure, when
21 you're using distributed systems with about a 300 pound
22 charge, during the stakeholder meetings we were told that
23 we would need to install hydronics systems to recover the
24 heat, to move it to a central air handler -

25 MS. BROOK: Well, we were accepting questions -

1 MR. RONN: Did you hear my question?

2 MS. BROOK: We did hear it and we can still hear
3 you.

4 MR. RONN: So, I guess the question is, we are
5 going to be required to install hydronics units to
6 recover the heat from distributed systems? Is that
7 correct?

8 MR. SCOTT: No, you would not be required to do
9 that.

10 MR. RONN: So if we're exceeding the refrigerant
11 charge amount specified in Item 2, whether it's the 20
12 percent or the .3 pounds per thousand Btu's that means we
13 don't want to comply with the heat recovery? Is that
14 what you're saying?

15 MR. SCOTT: No, the heat recovery would be
16 required and it's only 25 percent of the total available
17 heat for kind of that reason. You have a variety of
18 different types of refrigeration systems like distributed
19 systems, and you could also have a variety of types of
20 HVAC systems, and how do you line those up? So, if you
21 have distributive systems, you could use a water loop
22 that goes to each distributed unit and goes to a central
23 air handler, or you might associate a distributed unit
24 with one air handler or a rooftop. You would have to
25 utilize 25 percent of the heat somehow, you could do it

1 indirect or you could do it direct, as long as it stayed
2 below the charge limit, and that's exactly the feedback
3 we got was, that with a good low charge distributed
4 system, the percentage parameter doesn't make sense, it
5 needs to be a finite amount of charge.

6 MR. RONN: Well, the other concern I have,
7 though, is by the time you add all the pumps, piping,
8 reservoirs, you know, bladder valves, everything you need
9 to install the hydronics portion of the system, now the
10 cost benefit of any use of the distributed system is
11 pretty much negated and you're basically pushed back into
12 building large DX systems, you know, and you're talking
13 about going from like a three or four percent leak rate
14 to 10 or 11 percent.

15 MR. SCOTT: Yeah, so we don't think so and we
16 looked at a number of different scenarios, and one thing
17 to note is that, Martha, you might explain this a little
18 more, there is a compliance manual that gets done with a
19 lot of these and we have stated this in a number of
20 meetings that we realize a lot of information needs to be
21 provided about the different options and how this can be
22 done. So we looked at what is the exposure on
23 distributed systems, and that's part of the reason why
24 the initial requirement is only 25 percent, so you could
25 pick those units that, say, are close enough to a rooftop

1 unit, an air handler that you could go direct refrigerant
2 if you wanted at very low cost, or you could use a single
3 loop that attached to multiple distributed systems, and
4 there are examples where people have done that and that's
5 exactly what we used for our cost justification, was the
6 more expensive approach, the indirect approach with water
7 coils and heat exchangers and a water piping loop was
8 what we attempted to use as our cost assumption analysis.

9 MR. RONN: Okay, and the other comment I had was
10 on the motion sensors with the case lighting. In many
11 instances, the range of the motion doesn't generally
12 require a sensor for every case when you're looking at a
13 row of 30 doors, for example, about every third case is
14 appropriate for turning the lights on and off in the
15 lineup. So, I don't know if that's something you folks
16 have considered.

17 MR. SCOTT: That would be perfectly fine for this
18 requirement, which is just to say that the lights are
19 turned off during stocking hours and, currently, most of
20 that is done with a lighting panel contractor and an EMS
21 control point that just shuts it all off or maybe has
22 zoned overrides, or some people - a few people use case
23 controllers and do that, and the simplest approach is the
24 panel contractor, and if you did motion sensors per lineup
25 or for several cases, it would accomplish the same end

1 function.

2 MR. RONN: Well, correct, I understand that, it's
3 just that in the wording, you have it per case.

4 MS. BROOK: It says that on each case, yeah.

5 No, thank you for that comment, that's a good comment.
6 So, just to clarify what Doug was explaining about our
7 intention for the compliance manual, it will be to, you
8 know, have a lot of best practice design strategies
9 clearly articulated and diagramed. One thing we probably
10 will need to do in this case is make a commitment to get
11 that design information at least drafted, you know,
12 before the 45-day language, otherwise it just sounds
13 like, "Well, we promise to tell you later how to do it,"
14 right? So the point where the stakeholders want to be
15 making comments about whether the requirement is
16 reasonable, they also need to know that there is actually
17 design guidance for them, not a promise of design
18 guidance. So, I think that's a good comment and we
19 appreciate it, and it will help us guide our schedule and
20 resources for the next several months.

21 MR. RONN: Thank you.

22 MR. SCOTT: Sean.

23 MR. GOUW: Hi, this is Sean from Southern
24 California Edison. A quick question, [inaudible]

25 [00:48:35]?

1 MR. SCOTT: I didn't hear all that.

2 MR. SHIRAKH: Sean, it's very difficult to hear
3 you.

4 MR. GOUW: Oh, sorry about that.

5 MS. BROOK: There, that's good.

6 MR. GOUW: I was just asking if it was confirmed
7 that there weren't any Federal preemption issues with the
8 DOE's CRE regulations and the fact that they're about to
9 regulate walk-ins?

10 MR. SCOTT: I know a lot of time was spent on
11 that -

12 MS. BROOK: Well, the only thing that I remember
13 where we were really talking about the preemption was
14 that variable speed controller, and we ended up not going
15 forward with that, not because of preemption, but -
16 basically, where we ended up with preemption was, if the
17 measure could be installed in the field, then we thought
18 there was lots of precedent that that doesn't violate
19 preemption, but if you specify a requirement for
20 technology and the only way to achieve it is at the
21 factory, and part of the product manufacture that also
22 gets tested as part of a federal efficiency requirement,
23 then it would violate preemption, so I think where we
24 ended up, at least with our fan speed controllers, was
25 that we felt like that could be a field install

1 technology, but we're not actually going forward with
2 that particular measure right now.

3 MR. SCOTT: Right. There's a distinction between
4 walk-ins that have their own individual controllers in
5 supermarkets where the control is in the central
6 compressor, by and large, and that's what would be doing
7 the control -

8 MS. BROOK: Oh, okay.

9 MR. SCOTT: -- of the fan as it is currently
10 doing the control through electronic regulator or
11 something, so it may sense that was not probably related
12 to preemption.

13 MS. BROOK: Okay. Does that -

14 MR. GOUW: I wanted to ask about the display case
15 lighting controls because I know the Feds are about to
16 sort of try to give credit - I don't think it's in their
17 test method, but they're trying to give credit for
18 lighting controls. I was wondering if there might be any
19 issues there with the display cases.

20 MS. BROOK: I'm sorry, who is trying to get
21 credit for them?

22 MR. GOUW: The DOE, as part of the sort of energy
23 consumption metric they have.

24 MS. BROOK: Oh, I see. Is it part of their
25 prescriptive standard?

1 Mr. GOUW: It's going to be part of their
2 calculations in the next round.

3 MS. BROOK: Oh, I see.

4 MR. SCOTT: This measure applies to non-24-hour
5 stores and the Federal method would have to assume a case
6 used in a 24-hour store, as well, so it wouldn't seem
7 like there would be a conflict there.

8 MR. GOUW: Okay.

9 MS. BROOK: Any other questions?

10 MR. MCHUGH: This is Jon McHugh again. I
11 understand that, in terms of the scope for most of the
12 measures are focused on systems that are supermarket size
13 systems, you know, parallel rack type systems. A couple
14 of these measures seem like they would also be applicable
15 to smaller spaces and I'm primarily talking about, again,
16 the lighting controls, that any space that has display
17 cases that controls would apply to those spaces, so that
18 might be something that might be specifically applied to
19 all spaces that have these display cases. Any thoughts
20 about what would be the problems of expanding it to a
21 broader scope, all the convenience stores, 7-Eleven, all
22 these various places that are smaller?

23 MR. SCOTT: It's a good point, the distinction in
24 how they're currently controlled is that a convenience
25 store will typically have a big central box and several,

1 maybe two or three-door freezers and they all have manual
2 switches and the process is to go at night and turn off
3 those switches so there isn't necessarily central wiring.
4 It would require intercepting each of those. So, we did
5 look at cost-effectiveness of anything analogous to that,
6 so I think it would be a different cost-effectiveness
7 study, and how much savings is there of manually turning
8 the lights off vs. automating that, whereas, in a store,
9 there's stocking people and the tenancy in some cases is
10 those have to be left on for stocking, so this is just
11 controlled to turn it off and allow for stocking
12 overrides. So, it hasn't been looked at, but there are
13 some differences.

14 MR. GOUW: The different base case, okay, thank
15 you, that's great.

16 MR. SCOTT: Now, to think a little more, Jon, to
17 add to that, the motion sensor aspect which is really a
18 different deal and shutting off at night probably has a
19 very similar applicability, though.

20 MR. SHIRAKH: Any other questions or comments on
21 commercial refrigeration from people who are online, the
22 phone? Okay, so we're going to move to the next topic,
23 which is Refrigerated Warehouses.

24 MS. BROOK: Okay, so this is our last set of
25 proposals for the day and, in this case, refrigerated

1 warehouses, we began regulating in earlier Code Cycles,
2 and so the Code change proposals that we will be
3 introducing today are mostly changes to current code,
4 with some additional requirements. So, either changes to
5 current requirements or insertions into current Code
6 language. There are some additional scope explanations
7 added to Section 126. There are efficiency requirements
8 for exterior insulation of the warehouse, evaporator fans
9 and speed controls, condenser design temperature
10 requirements, condenser fan speed controls, condenser
11 specific efficiency, variable speed compressors, and
12 infiltration barrier requirements that we'll be
13 describing. And we've also added significantly to the
14 Acceptance Tests that are required now for getting credit
15 for complying with the Code and for refrigerated
16 warehouses.

17 So, exterior insulation, there's basically just a
18 change to the insulation table in Table 126A, R-40 for
19 roofs and ceilings of freezers, and R-35 for freezer
20 floors, and then the new requirement for R-20 for floors
21 with all heating from productive refrigeration capacity.
22 And a few minor changes to the way we name spaces. Do
23 you want to clarify anything here, Doug?

24 MR. SCOTT: I think an important thing here was
25 to define cooler spaces for refrigerated warehouses a

1 little better, the 28 degree break point, instead of 32,
2 resolved the potential problem of many meat coolers and
3 deli coolers that are designed at 30 or 31 degrees being
4 called freezers and having to have freezer insulation
5 requirements and floor requirements and some other
6 factors, so this is a clean-up to make it a little more
7 cost-effective and equitable, and we really needed to do
8 that before we increased the freezer roof insulation
9 here, and the R-35 to R-36 is kind of a clean-up because
10 the insulation is available in R-5 increments. That's
11 all on that.

12 MS. BROOK: Okay. The next requirement is to
13 modify the current Code language for evaporator - fan
14 powered evaporators. So, we already had a variable speed
15 control requirement for evaporators, but we had
16 previously exempted evaporators served by a single
17 compressor, that did not have a moding capability and
18 we've replaced that exception with a requirement for
19 evaporator fans served by a single compressor to utilize
20 controls to reduce air flow by at least 40 percent,
21 three-quarters of the time when the compressor is not
22 running. So, is there anything else you want to explain
23 about these Code changes, Doug?

24 MR. SCOTT: That last one, the single compressor
25 and cycling fans could be variable speed, running in two-

1 speed modes, or a two-speed motor. Some of the smaller
2 evaporators now have an almost zero cost two-speed
3 feature, or it could be turning off a portion of the fan
4 motors in a particular evaporator coil, which is
5 available from one or two manufacturers, so there are
6 several ways to meet that requirement. That's all on
7 that.

8 MS. BROOKS: Okay. Our next requirement or set
9 of requirements are for condensers and the first one sets
10 conditions for fan powered condensers to conform to this
11 table, instead of requiring ammonia systems to be
12 evaporatively cooled, this now allows the ammonia to be
13 used with air-cooled condensing, and there's no inherent
14 requirement to use air-cooled rather than evaporative-
15 cooled, which was happening with the way the previous
16 Code was written. Do you want to -

17 MR. SCOTT: So, previously, nothing said you had
18 to use evaporative-cooled or air-cooled in a given
19 application, but if you chose to use air-cooled, then you
20 would not be allowed to use ammonia and, as this
21 statement shows, ammonia generally is more efficient than
22 the HFC option, so why, if you're using air-cooled,
23 should you not be allowed to use ammonia is all that this
24 resolved, allowed the use of ammonia.

25 MS. BROOK: Okay. Our next Code language changes

1 are in regards to condensers and mostly clarification
2 language. Is there anything significant you want to
3 mention about these Code changes?

4 MR. SCOTT: It is mainly clean-up has been
5 clarified and explained a little bit in the compliance
6 manual previously, but just brought into the Code
7 language and made more clear.

8 MS. BROOK: Great, thanks. Okay, the next set of
9 Code language for condensers is adding a requirement for
10 condensing temperature reset and allowing an exemption
11 for condensing temperature control strategies that might
12 be equivalent from the energy performance perspective,
13 but we don't know about them yet, and if those come in
14 for approval, the Commission's Executive Director can
15 approve alternatives to condensing temperature reset if
16 they're demonstrated to provide the same or better energy
17 savings.

18 MR. SCOTT: Here, again, I think ambient
19 following was required for air-cooled in the Code, but it
20 was vague for evaporative-cooled and was explained in the
21 compliance manual. This just makes it more exacting what
22 was intended for ambient reset condenser control.

23 MS. BROOK: Okay, and then similar to what we saw
24 in the commercial refrigeration, we have a condenser
25 specific efficiency requirement and this table summarizes

1 the minimum efficiency in Btu hours per watt for
2 different categories of condenser and refrigerant.

3 MR. SCOTT: Here for evaporative condensers, at
4 least on the larger condensers, this is a little more
5 stringent vs. the average of what's been used. I think
6 historically the new construction incentive programs used
7 a base case of 330, so it's not much higher than that,
8 but that 350 is somewhat higher than some of the
9 available condenser models. However, on these models,
10 they're all very flexible, it seems, in terms of buying a
11 condenser in this large of size with whatever motor size
12 you want to use, so it's fairly adjustable in these
13 products to meet a particular efficiency requirement, the
14 smaller size, less than 8,000 Mbh, 8 million Btu's,
15 addresses the fact there's fewer products available in
16 the small size, and sometimes in that size range, the
17 condensers have to go indoors, so that it looks at just
18 the realities of some of the installations, as well as
19 the available product in the marketplace.

20 MS. BROOK: All right, and then finally for
21 condensers, we have a requirement that air cooled
22 condensers will have a fin density no greater than 10
23 fins per inch, except if you're using micro-channel
24 condensers, and this replaces a previous requirement that
25 single phase condenser motors be either permanent split

1 capacitor or ECM.

2 On to compressors, we have - what the big deal
3 here is, the screw compressors shall include an ability
4 to vary the compressor volume ratios - I'm trying to move
5 my thing so I can see the words - in response to
6 operating pressures. And what else is significant here,
7 Doug?

8 MR. SCOTT: Two issues in that the number three
9 item is the mandatory variable VI or Variable Volume
10 Ratios, so the compressor, as it is operating, reads the
11 pressures and essentially changes its compression ratio,
12 whereas some compressors you have to shut down and do
13 that manually. And this was in the compliance manual,
14 but it wasn't in the Code, so we re-studied this and
15 verified that this is either standard practice or a
16 reasonable cost option, and very cost-effective. And
17 previously, the Item number two is simplified from the
18 requirement that stated if you had less than 60 percent
19 power at 60 percent load, then you were exempt from a
20 variable speed requirement, and that was difficult
21 because compressor ratings were not certified to any
22 rating standard and, moreover, the part load performance
23 of these big screw compressors is arguably less well
24 documented and understood than in their fuller capacity,
25 so feedback from industry said to try to make this

1 simpler, and we looked at application conditions and
2 found that all current compressors were cost-effective,
3 with variable speed below this application condition, so
4 it turns into a mandatory variable speed on open drive
5 screw compressors below this application temperature.
6 Now, this is only in the case of systems that have one
7 screw compressor for a suction group, if you have
8 multiple screw compressors on a suction group, which most
9 large plants do, then this would not apply.

10 MS. BROOK: Okay, finally, we are at infiltration
11 barriers. And this is a new requirement for passageways
12 between freezers in higher temperature spaces and
13 passageways between coolers in non-refrigerated spaces to
14 have an infiltration barrier consisting of strip
15 curtains, an automatically closing door, or air curtain
16 designed by its manufacture for use in the passageway and
17 temperature for which it is applied. Any clarifications
18 there?

19 MR. SCOTT: What you cannot do here, you cannot
20 have a manually operated sliding door where you have to
21 get off a forklift and go close it, so it looks like you
22 can have just about everything, but that's generally
23 what's targeted, I guess, a door that could be open and
24 just left wide open.

25 MS. BROOK: Okay.

1 MR. SCOTT: With some concern over air curtains,
2 which it's uncertain whether an air curtain really saves
3 more or uses more energy, but it found that passageways,
4 as makes sense, really depend a lot on operations of a
5 facility, so there are all sorts of different operations
6 through passageways, so this needed to be pretty flexible
7 to meet all those different application conditions.

8 MS. BROOK: Okay. And then, finally, quite a bit
9 of work has been done to complete very thorough
10 acceptance test specifications for electric resistance
11 under slab heating systems, evaporators, and evaporator
12 fan motor variable speed controls, evaporative condensers
13 and condenser fan motor variable speed control, air cool
14 condensers and condenser fan motor variable speed
15 control, and the variable speed screw compressors, and
16 each of these tests include both construction inspection
17 and functional testing requirements, and I would
18 encourage anybody interested to look at the case report.
19 They are very detailed, thorough test procedures
20 specified, much too detailed to go through now, but
21 certainly would like to have comments on the
22 applicability and functionality of those tests, if
23 anybody is willing to provide us those comments, we would
24 appreciate it. And I think that's it for refrigerated
25 warehouses. We would like to attempt to answer any

1 questions that people have right now.

2 MR. SHIRAKH: Any questions from the audience in
3 the room? Jamy? Okay, anybody on the phone? Amazing.
4 So there are no more questions. Again, I think the
5 process of the stakeholder meetings has really been
6 successful, in my opinion, in making these workshops go
7 really smoothly, better than I had anticipated.

8 MS. BROOK: So now we can probably cover two or
9 three times the amount of material we thought we could
10 cover in every workshop.

11 MR. SHIRAKH: That's probably true. Just a
12 reminder, this was a third workshop we've had this month
13 and we have two more coming up, one on the 27th, which is
14 the Wednesday of next week, and the last one for non-
15 residential topics will be May 5th, and we will be
16 discussing non-residential envelope and more HVAC and
17 some hot water issues, so please look for the
18 announcements and the agendas that will be coming out.
19 And then, following those, we will have three workshops
20 in late May and early June, and during those workshops,
21 we will be discussing residential topics.

22 MS. BROOK: And the other thing that we just sort
23 of have on the radar is that we'll have our ACM workshops
24 probably also later in June, maybe even July, and also we
25 want to focus our workshop on our Reach Standards, and

1 that will be in that June-July timeframe.

2 MR. SHIRAKH: And then later in summer we will
3 publish our Draft Standards and we will have a workshop
4 to present the Draft Standards, and then in the fall, we
5 will go to the rulemaking phase and publish the 45-day
6 and, if needed, the 15-day language. Martha has one more
7 thing.

8 MS. BROOK: The final slide has my contact
9 information, so anybody who wants to provide comments on
10 today's workshop topics, we would like to seriously
11 consider all comments that are submitted in the next week
12 in order to stay on top of them and to get the comments
13 resolved. Of course, we'll accept them after that, but
14 we'll get direct attention on them early if you can
15 provide those within the week's time to the contact
16 information you see on this slide now.

17 MR. SHIRAKH: If there are no more questions or
18 comments, we will close this workshop and we will do it
19 again next week on the 27th. Thank you.

20 (Adjourned at 2:31 p.m.)

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